CONFIRMATORY RESULTS

In TABLE III below we summarize the optical properties of two DARCs made according to the process of the present invention ---- one comprising 3 layers and one comprising 4 layers.

TREATMENT	no. of layers	T (Å)/ NU(%)	RI/ NU(%)	K/ NU(%)
none	3	867/0.86	1.990/0.18	0.410/1.30
N_2O plasma	3	872/0.76	1.924/0.22	0.372/2.30
none	4	1146/0.87	1.983/0.30	0.4314/3.235
N_2O plasma	4	1152/0.78	1.936/1.85	0.3713/4.638

TABLE III

where T=thickness, NU=non-uniformity, RI=refractive index, K=extinction coefficient

TABLE III confirms that plasma treatment of individual layers that together make up a DARC film really does alter said DARC film's optical properties.

What is claimed is:

1. A process for forming a dielectric anti-reflection coating, having a final thickness, comprising the steps of:

(a) depositing a dielectric layer having a thickness that is at most half said final thickness;

(b) exposing said dielectric layer to a gaseous plasma for a period of time; and

repeating steps (a) and (b), with no intervening layers, until a total layer thickness equal to said final thickness has been achieved.

2. The process described in claim 1 wherein said gaseous plasma is nitrous oxide gas.

3. The process described in claim 1 wherein said gaseous plasma is selected from the group consisting of helium, argon, ammonia, oxygen, and nitrogen.

4. The process described in claim 1 wherein said dielectric layer is selected from the group consisting of silicon oxynitride and silicon oxycarbide.

5. The process described in claim 1 wherein steps (a) and (b) are repeated between 2 and 5 times.

6. The process described in claim 1 wherein said final thickness is between about 500 and 2,000 Angstroms.

7. The process described in claim 1 wherein said period of time is between about 5 and 20 seconds.

8 . A process for forming a dielectric anti-reflection coating, having a predetermined refractive index, extinction coefficient and final thickness, comprising:

through simulation, determining composition, thickness, and surface treatment for each of a number of layers of said dielectric whereby said number of layers have a total thickness equal to said final thickness and a structure formed of said number of layers has said predetermined refractive index and extinction coefficient; then

(a) depositing a layer of dielectric material having the thickness and composition determined through said simulation;

(b) exposing said layer of dielectric material to the surface treatment determined through said simulation; and

repeating steps (a) and (b), with no intervening layers, until said number of layers has been deposited.

9. The process described in claim 8 wherein said dielectric layer is selected from the group consisting of silicon oxynitride and silicon oxycarbide.

10. The process described in claim 8 wherein said surface treatment further comprises exposing said dielectric layer to a gaseous plasma for a period of time.

11. The process described in claim 10 wherein said gaseous plasma is selected from the group consisting of nitrous oxide, helium, argon, oxygen, and nitrogen.

12. The process described in claim 10 wherein said period of time is between about 5 and 20 seconds.

13. The process described in claim 8 wherein said number of layers is between 2 and 5.

14. The process described in claim 8 wherein said final thickness is between about 500 and 2,000 Angstroms.

15. The process described in claim 8 wherein step (b) further comprises measuring refractive index and extinction coefficient and then using said measurements to modify said thickness, composition, and surface treatment conditions during subsequent repetitions of steps (a) and (b).

16. A process for forming a dielectric anti-reflection coating, having a predetermined refractive index, extinction coefficient and final thickness, comprising the steps of:

(a) depositing a dielectric layer having a thickness that is at most half said final thickness;

(b) exposing said dielectric layer to a gaseous plasma for a period of time;

repeating steps (a) and (b), with no intervening layers, thereby forming a stack of layers, until a total layer thickness equal to said final thickness has been achieved;

after each stack has been formed, determining refractive index and extinction coefficient values for that stack; and

based on said determined values, adjusting conditions during subsequent steps whereby, after said final thickness has been achieved, a final stack having said pre-determined refractive index and extinction coefficient is formed.

17. The process described in claim 16 wherein said dielectric layer is selected from the group consisting of silicon oxynitride and silicon oxycarbide.

18. The process described in claim 16 wherein said gaseous plasma is nitrous oxide gas.

19. The process described in claim 16 wherein said gaseous plasma is selected from the group consisting of helium, argon, ammonia, oxygen, and nitrogen.

20. The process described in claim 16 wherein steps (a) and (b) are repeated between 2 and 5 times.

21. The process described in claim 16 wherein said final thickness is between about 500 and 2,000 Angstroms.

22. The process described in claim 16 wherein said period of time is between about 5 and 20 seconds.

23. The process described in claim 16 further comprising, prior to depositing any layer, determining, through simulation, composition, thickness, and surface treatment for each layer of said final stack.

24. A dielectric anti-reflection coating, comprising:

a number of contiguous layers, each of said layers further comprising a dielectric layer whose upper surface has been exposed to a gaseous plasma.

25. The anti-reflection coating described in claim 24 wherein said gaseous plasma was selected from the group consisting of nitrous oxide, helium, argon, ammonia, oxygen, and nitrogen.

26. The anti-reflection coating described in claim 24 wherein said dielectric layer is selected from the group consisting of silicon oxynitride and silicon oxycarbide.

27. The anti-reflection coating described in claim 24 wherein the number of contiguous layers is between 2 and 5.

28. The anti-reflection coating described in claim 24 wherein said anti-reflection coating has a thickness is between about 500 and 2,000 Angstroms.